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Enlisting Science's Lessons to Entice More Shoppers to Spend More

By KENNETH CHANG

A shopper entered the OfficeMax store in Macedonia, Ohio, and paused briefly to pick up a canvas shopping bag from a rack near the front door.

Ann Marshall, an artist who has a part-time job as a sort of anthropologist of shopping, noted that on her clipboard.

"That's unusual," said Ms. Marshall, who was watching from a short distance away among the laser printers and fax machines. The man was the first shopper whom she saw use one of the shopping bags.

He then headed for the pen department. Ms. Marshall sketched his path among the pens on a schematic of the store's floor plan, noting which displays he looked at and how long he spent in each part of the store.

Retailers have always had numbers on sales, costs and profits, as well as numbers crunchers searching for ways to make more money. Supermarkets, which sell large quantities of goods but at low profit margins, have been particularly fanatical about the exact positioning of products to nudge buyers toward more profitable items.

But now more and more retailers are also using more rigorous scientific techniques to improve their bottom line.

OfficeMax is one example. It has hired Envirosell, a market research company based in New York that takes an anthropological approach to understanding how shoppers navigate stores. Other companies turn to statistical methods used in testing nuclear weapons. New scientific technologies like brain scans also allow companies to peer directly into consumers' minds.

"The experience we create by scientifically understanding how customers interact with our stores can make a big difference," said Ryan Vero, chief merchandising officer of OfficeMax.

The computerization of the cash register — OfficeMax has a record of every sale at every store — already provides a wealth of knowledge about what people are buying. Almost every store, for example, sells index dividers next to binders, because it seems obvious that someone buying a binder might need dividers.

The receipts showed that people were indeed buying index dividers in tandem with binders — except that many people were not picking up the packages of dividers next to the binders. Instead, the shoppers searched in a completely different part of the store for different dividers. Many people, it turned out, want bigger packages.

OfficeMax moved the larger packages next to the binders, and sales of the index dividers increased. Although receipts show what people are buying, they do not show how people are shopping.

Two years ago, Envirosell studied several OfficeMax stores to see how well customers could find what they were looking for. In February, a team of Envirosell "trackers," including Ms. Marshall, descended on a recently renovated store near the corporate office of OfficeMax to see how well the new layout worked.

Paco Underhill, founder and chief executive of Envirosell, has carved a career out of observing shoppers shopping. In his book "Why We Buy: The Science of Shopping" (2000), Mr. Underhill expounded on the dangers of "butt brushes" (if the aisles are too narrow and people brush up against each other when they pass, they tend to leave the store), the tendency of shoppers to turn right on entering a store and the importance of not putting anything important in the first few feet of the store entrance, because shoppers quickly stroll through that zone without noticing anything in it.

That is why almost none of the OfficeMax shoppers picked up a shopping bag. The stand with the bags was in the decompression zone, so people had already walked passed it before they took a look around.

In older OfficeMax stores, the aisles are laid out like a Manhattan street grid. The shelves were high and signs not always easily seen. In its study, in 2004, trackers found that a sizable number of shoppers became confused trying to find what they wanted to buy.

In the Ohio store, the aisle grid has been replaced by a "racetrack," with the main wide aisle looping around the store. Outside the main aisle, the store is divided into zones, each centered on a specific "destination product." The center area, inside the racetrack, is a spotlight area for expensive electronic gadgetry like computers, copiers and digital cameras.

The layout has accomplished much of what OfficeMax had been hoping for. In the original study, two-thirds of the shoppers never made it to the rear of the store. The less cluttered design provides a clear view of the far wall. In the February study, more than half the shoppers reached the back area in Macedonia.

In looking into consumers' minds, Dr. Joshua Freedman, a clinical professor of psychiatry at U.C.L.A., uses a brain scan known as functional magnetic resonance imaging that displays an increase in blood flow in the brain, a result of churning neurons that are demanding extra oxygen.

Dr. Freedman, along with his brother Thomas, a political adviser in the Clinton administration, and William Knapp, a political media strategist, used such scans in 2004 to analyze voters' reactions to political commercials.

"Then we thought, Politics may not be quite ready for this," Dr. Freedman recalled. "We said, 'We should try this out in general marketing.' "

The three formed FKF Applied Research, a consulting firm that sticks people in magnetic resonance imaging machines and shows them television commercials. What the investigators have found is a third to a half of commercials do not generate any brain reaction at all.

"There was no engagement," Dr. Freedman said.

Any advertisement that did not generate any reaction would be unlikely to compel someone to go buy something, he said.

In commercials that did spur brain activity, reactions appeared to be in conflict, Dr. Freedman said.

"Almost always, if you activated one part of the brain," he said, "you activated many competing parts of the brain."

For example, an appealing car commercial might activate not only the orbitofrontal cortex and ventral striatum, the parts of the brain that shout, "Wow, I want that car now!" but also the amygdala, the part of the brain associated with fear and anxiety, perhaps warning, "That would be a stupid impulsive thing to do."

"That keeps me from going out and immediately buying the car," Dr. Freedman said.

The scans could help advertisers dump commercials that do not work at all and fine-tune watchers' reactions. Dr. Freedman said his company's clients included advertising agencies and manufacturers of consumer products.

A different tack is taken by QualPro Inc. of Knoxville, Tenn., another consulting company that offers help to retailers. It employs statistical techniques used in testing nuclear weapons to test different ideas at once.

Take car dealers' ads with their catchy slogans and exclamation points like, "Clean sweep clearance this weekend only!"

Even that garish genre has variations. Is it helpful to know the number of cars on the dealer's lot? Should the ad emphasize the price or the monthly payments or the interest rate on a car loan? Is it enticing to know that the Bankston Nissan dealers in Texas are part of AutoNation Inc., which has been on the Fortune magazine list of America's Most Admired Companies for four years in a row?

AutoNation, a conglomeration of dealerships based in Fort Lauderdale, Fla., was indeed interested. It enlisted QualPro last year to test what combination of factors made for more effective newspaper ads. The process began with a brainstorming session to generate ideas that were whittled to 30, with the criteria that they were easy to use and did not add significant cost.

Some factors tested seemed obvious. Surely, a full-page ad attracts more attention than a half-page ad, and a splash of color should also be catchier.

Some seemed trivial. Would a larger map showing the dealer's location help?

Typically, most scientific experiments try to test one variable while keeping all other factors constant. For example, in tests of new drugs, participants are carefully chosen so that two groups have the same mix of age, sex and health with one group, and the only difference is that one group receives the drug and the other receives a placebo.

But to test 30 variables one at a time would take a long time and would be prohibitively expensive. One-at-a-time experimentation would also miss instances involving multiple factors — synergy, in other words, the 1990's buzzword. The QualPro method, multivariable testing or M.V.T., originated in World War II, when the British were seeking ways how to shoot down German bombers more effectively. Given the urgency of the task, two British statisticians developed a way to test different tactics quickly.

Charles Holland, founder of QualPro, came across a paper by the statisticians describing the method and its success in the 1960's, when he was an employee of Union Carbide heading a statistics group at the Oak Ridge National Laboratory.

Dr. Holland's first high-profile use of multivariable testing was in 1969. Oak Ridge was in charge of manufacturing high-strength low-weight carbon foam parts for nuclear weapons. The manufacturing of the parts was failing spectacularly. Some 85 percent were defective and thrown away. The lab was considering starting anew at a cost of several million dollars.

Dr. Holland persuaded lab managers to let him try to find a less draconian remedy. He had one eight-hour shift. The statisticians gathered the workers who made the parts and asked them about changes that should be tried, like "drop the mold on the ground to drive out large air bubbles."

One worker said his mother did that after pouring batter into a cake mold.

That one shift found enough factors to increase the success rate from 15 percent to 60 percent. Subsequent fine-tuning raised the percentage to 85 percent, and then 99.

For AutoNation, the stakes are lower, but not trivial. It spends millions of dollars a year on advertising. Traditionally, dealers created their own advertising and, through experience, came up with what they thought worked best. But different dealers often had different ideas, and AutoNation wanted a better idea of what worked.

"Can you learn the wrong things from history?" said Art Hammer, the QualPro consultant working with AutoNation. "Yes."

For four weeks last spring, AutoNation's advertising agency generated ads for 40 dealers following recipes testing 29 factors. For each factor, QualPro compared the dealers that had incorporated the changes with those that had not.

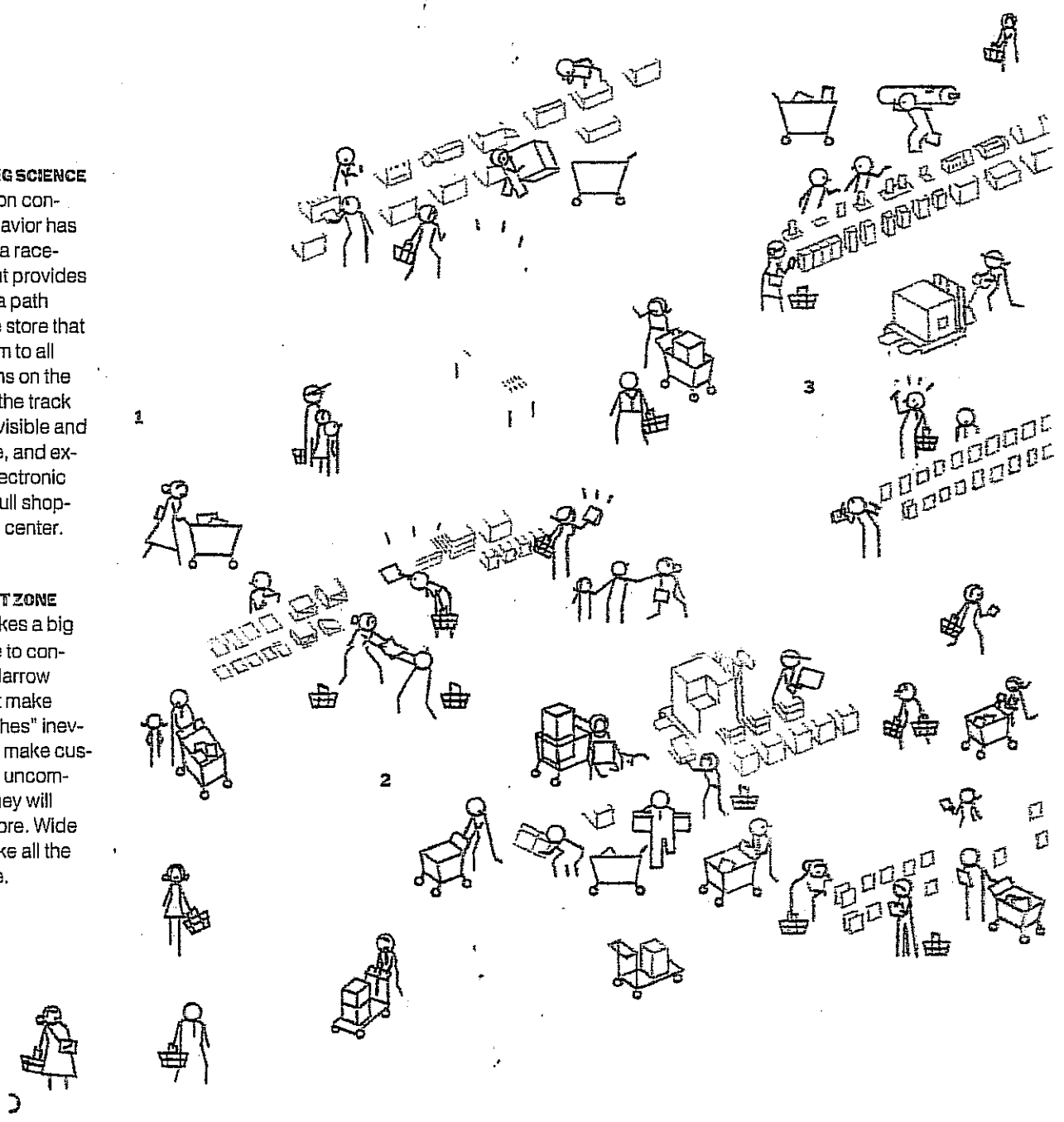
Typically, one-quarter of the factors help, one-quarter hurt and half have no effect at all, Mr. Hammer said.

Some surprises popped out. A full-page ad was no more effective than a half-page one. The addition of color — a considerable expense — did not generate any extra sales.

"Ad size didn't have an effect," Gary Marcotte, senior vice president of marketing at AutoNation, said. "Color didn't have an effect. When you put them together, they did have an effect."

Now, the company is moving much of its advertising to half-page color advertisements.

"When done effectively, it's just as effective as a full page ad," said Mr. Marcotte, who added that he had not expected that result. "It's shown us that science can be more effective than gut."



1 SHOPPING SCIENCE
Research on consumer behavior has found that a racetrack layout provides shoppers a path around the store that brings them to all areas. Items on the outside of the track are easily visible and accessible, and expensive electronic gadgets pull shoppers to the center.

2 COMFORT ZONE
Space makes a big difference to consumers. Narrow aisles that make "butt brushes" inevitable can make customers so uncomfortable they will leave a store. Wide aisles make all the difference.

3 LOCATION, LOCATION, LOCATION
Cash register data in one store showed that although dividers were placed with the loose-leaf binders, many shoppers preferred larger packages of dividers that were stored in a different location. The large packages were moved next to the binders.

4 EYES RIGHT
As they enter a store, consumers get their bearings, and are not disposed to buy. Most immediately turn right.

5 FINISH LINE
Computerized cash registers have provided a vast database of information about buying habits.